



Mayor Jim Newberry

**LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT**

Division of Water and Air Quality

October 1, 2009

Jennifer Spradlin  
Pretreatment Coordinator  
Division of Water  
Frankfort Regional Office  
200 Fair Oaks  
Frankfort, Kentucky 40601

Dear Ms. Spradlin,

Enclosed are Lexington-Fayette Urban County Governments local limit evaluation for Town Branch and West Hickman Wastewater Treatment Plants. The spreadsheet are available in electronic format should you require. Should you have any questions or require additional information, please contact me at 859-425-2412 or [richard@lexingtonky.gov](mailto:richard@lexingtonky.gov).

Regards,

Richard Lamey  
Compliance and Monitoring Manager

Cc. File

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Lexington-Fayette Urban County Government  
Division of Water Quality  
Compliance and Monitoring Section

Local Discharge Limits Evaluation for  
Town Branch and West Hickman Creek Wastewater Treatment  
Plants

October 1, 2009



**Background:**

The Division of Water Quality is required by 40 CFR part 403 and our KPDES Permit to perform a periodic evaluation of local discharge limits for the Town Branch WWTP and the West Hickman Creek WWTP. The limit study evaluated the adequacy of current limits for the protection of the WWTP, sludge quality and receiving waters.

Currently, sixteen (16) parameters are regulated by limit under the Lexington-Fayette Urban County Government's (LFUCG) sewer use ordinance. The Division of Water Quality's last limit evaluation was completed in 2002. Changes resulting from that evaluation include lowering of Chromium VI and cadmium limitations for both Town Branch WWTP and West Hickman WWTP. LFUCG proposes raising the limit at both plants for mercury from 0.0005 to 0.005 mg/L

**Method:**

Limit analysis for both plants was performed using the Maximum Allowable Headworks Loading Method (MAHL). The method determines the maximum loading of a pollutant that can be received at the plant headworks without pass through, plant interference or degradation of sludge quality. Removal efficiencies were calculated using Mean Removal Efficiency (MRE) calculations. All influent and effluent values were averaged and the removal efficiency was calculated from the average of the influent and effluent values.

The limiting factor for the majority of pollutants was pass-through based on environmental water quality standards for plant receiving streams. Collection system interference, process inhibition/interference and worker safety were also considered. This maximum allowable loading minus the domestic and commercial contribution and a safety factor was then allocated to local industrial users through a uniform concentration limit. Decisions on data values below the detection limit were made cautiously and in accordance with EPA 2004 Guidance Manual on Development of Local Discharge Limitations. Literature removal values were used for parameters that did not yield a removal efficiency due to influent and effluent data being less than the detection limit.

**Data Collection and Manipulation:**

Data manipulation was performed on a Microsoft Excel spreadsheet developed by EPA Region V and modified for LFUCG's needs. The LFUCG began data collection for limit evaluation in October 2007. All data was collected and analyzed in accordance with 40 CFR 136. Data collection points include:

|                                      |   |
|--------------------------------------|---|
| Town Branch WWTP                     | Raw Influent<br>Plant Effluent                                    |
| West Hickman Creek WWTP              | Raw Influent<br>Plant Effluent<br>West Hickman Creek, Above plant |
| Background (Domestic and Commercial) | Various Locations   |

The LFUCG elected to use outside laboratories for sample analyses. For most pollutants, the Town Branch laboratory does not have the capability to produce detection limits low enough for this study.

Accuracy and usefulness of data values at times became an issue. In order to properly evaluate plant removal efficiencies LFUCG needed actual values, not below detection values. Plant influent and effluent values below detection yielded a removal efficiency of zero and were useless in evaluating of plant performance. The initial contract laboratory, due to lack of communication and staff changes, did not provide detection levels as low as needed.

Laboratories used for sample analysis were McCoy and McCoy Laboratories, Inc. and Microbac Laboratories, Inc. LFUCG received multiple sets of questionable free cyanide results on background samples from McCoy Laboratory. LFUCG began using Microbac for sample analysis in December 2008. Free cyanide results were typically below detection after the change to Microbac. LFUCG believes that discarding this data is justified for several reasons; abnormally high results originated from four different sample locations, there is not reasonable expectation to find this pollutant in residential/retail/commercial discharges and that results from Microbac were within expected ranges based on sampling from previous years.

Upon changing laboratories, LFUCG was able to obtain lower detection limits from Microbac. Substitution of  $\frac{1}{2}$  detection limit for the detection values was utilized when all samples were below detection. The substitution was used on partial sets of data when later data with lower detection limits indicated the substitution was justified.

#### **Activated Sludge Inhibition Evaluation:**

Local limit evaluation based on plant inhibition using activated sludge (AS) inhibition as a limiting factor indicated that current limits are adequate in the protection of plant process at both wastewater treatment plants. Literature values were used for primary removal efficiency and inhibition levels.

#### **Plant and Industrial Flows:**

Plant flow used for the evaluation is the average flow from 2003 to 2008. Industrial flow is based on the industries which contribute pollutants of concern. Some permitted industrial facilities, such as hospitals and prisons, discharge conventional pollutants only and their flows were not used in calculation of limits.

#### **Chronic Water Quality Standards Evaluation:**

Local limit evaluation using the receiving stream water quality standard as the limiting factor indicated that two of the current limits for both Town Branch and West Hickman

WWTP's should be lowered. LFUCG proposes to lower these limits to the level proposed by the evaluation.

### **Town Branch WWTP**

The Town Branch WWTP process consists of primary clarification followed by activated sludge aeration treatment and final clarification. The study yielded limits for two parameters that should be lowered. LFUCG proposes to lower the limits for cadmium and hexavalent chromium to the levels recommended by the evaluation.

|  |                   |               |    |
|--|-------------------|---------------|----|
| Arsenic:   | Current Limit:    | 0.38 mg/l     |    |
|  | Evaluation limit: | 5.601 mg/l    | ✓  |
|  | Proposed limit:   | 0.38 mg/l     |    |
| Cadmium:   | Current Limit:    | 0.12 mg/l     |    |
|  | Evaluation limit: | 0.021374 mg/l | ↓  |
|  | Proposed limit:   | 0.02 mg/l     |    |
| Chromium:  | Current Limit:    | 7.0 mg/l      |    |
|  | Evaluation limit: | 842.92 mg/l   | ✓  |
|  | Proposed limit:   | 7.0 mg/l      |    |
| Hexavalent Chromium:                               |                   |               |    |
|  | Current Limit:    | 0.25 mg/l     |    |
|  | Evaluation limit: | 0.1121 mg/l   | ↓  |
|  | Proposed limit:   | 0.11 mg/l     |    |
| Copper:  | Current Limit:    | 1.0 mg/l      |    |
|  | Evaluation limit: | 1.05 mg/l     | ✓  |
|  | Proposed limit:   | 1.0 mg/l      |    |
| Cyanide(free)                                      | Current Limit:    | 0.23 mg/l     |    |
|  | Evaluation limit: | 0.254 mg/l    | ✓  |
|  | Proposed limit:   | 0.23 mg/l     |    |
| Cyanide (total)                                    |                   |               |    |
|  | Current Limit:    | 1.1 mg/l      |    |
|  | Evaluation limit: | N/A           | ✓  |
|  | Proposed limit:   | 1.1 mg/l      |    |
| Comments: Could not calculate limit due to no WQS. |                   |               |    |
| Lead:  | Current Limit:    | 0.3 mg/l      |    |
|  | Evaluation limit: | 1.19 mg/l     | ✓  |
|  | Proposed limit:   | 0.3 mg/l      |    |
| Mercury:   | Current Limit:    | 0.0005 mg/l   |    |
|  | Evaluation limit: | 0.0135 mg/l   | ↑  |
|  | Proposed limit:   | 0.005 mg/l    | PN |

Comments: Propose to raise limit to 0.005 mg/L. Raising of limit is justified by the study. Current limit is overly stringent for some industrial users. No excursions of WQS.

|         |                   |             |
|---------|-------------------|-------------|
| Nickel: | Current Limit:    | 2.5 mg/l    |
|         | Evaluation limit: | 13.47 mg/l  |
|         | Proposed limit:   | 2.5 mg/l    |
| Silver: | Current Limit:    | 0.64 mg/l   |
|         | Evaluation limit: | 1.78 mg/l   |
|         | Proposed limit:   | 0.64 mg/l   |
| Zinc:   | Current Limit:    | 4.1 mg/l    |
|         | Evaluation limit: | 21.609 mg/l |
|         | Proposed limit:   | 4.1 mg/l    |

#### **West Hickman WWTP:**

The treatment process used by the West Hickman WWTP is a modified activated sludge process with biological phosphorus removal, two stage nitrification system and final clarification. The study yielded limits for two parameters that should be lowered. LFUCG proposes to lower the limits for cadmium and hexavalent chromium to the levels recommended by the evaluation.

|                      |                   |             |
|----------------------|-------------------|-------------|
| Arsenic:             | Current Limit:    | 4.5 mg/l    |
|                      | Evaluation limit: | 38.307 mg/l |
|                      | Proposed limit:   | 4.5 mg/l    |
| Cadmium:             | Current Limit:    | 0.22 mg/l   |
|                      | Evaluation limit: | 0.1472 mg/l |
|                      | Proposed limit:   | 0.14 mg/l   |
| Chromium:            | Current Limit:    | 7.0 mg/l    |
|                      | Evaluation limit: | 273.28 mg/l |
|                      | Proposed limit:   | 7.0 mg/l    |
| Hexavalent Chromium: |                   |             |
|                      | Current Limit:    | 0.25 mg/l   |
|                      | Evaluation limit: | 0.2202 mg/l |
|                      | Proposed limit:   | 0.22 mg/l   |
| Copper:              | Current Limit:    | 1.0 mg/l    |
|                      | Evaluation limit: | 22.403 mg/l |
|                      | Proposed limit:   | 1.0 mg/l    |
| Cyanide(Free):       | Current Limit:    | 1.0 mg/l    |
|                      | Evaluation limit: | 1.51 mg/l   |
|                      | Proposed limit:   | 1.0 mg/l    |

Cyanide (total)

Current Limit: 1.0 mg/l

Evaluation limit: N/A

Proposed limit: 1.0 mg/l

Comments: Could not calculate limit due to no WQS.

Lead: Current Limit: 0.6 mg/l

Evaluation limit: 4.0725 mg/l

Proposed limit: 0.6 mg/l

Mercury: Current Limit: 0.0005 mg/l

Evaluation limit: 0.0733 mg/l

Proposed limit: 0.005 mg/l

Comments: Propose to raise limit to 0.005 mg/L. Raising of limit is justified by the study. Current limit is overly stringent for some industrial users. No excursions of WQS.

Nickel: Current Limit: 4.1 mg/l

Evaluation limit: 29.576 mg/l

Proposed limit: 4.1 mg/l

Silver: Current Limit: 4.8 mg/l

Evaluation limit: 12.017 mg/l

Proposed limit: 4.8 mg/l

Zinc: Current Limit: 4.1 mg/l

Evaluation limit: 136.52 mg/l

Proposed limit: 4.1 mg/l

**Proposed Limits:**

Based on this limit evaluation some current limits are not adequate in protection of receiving waters.

**Town Branch Wastewater Treatment Plant**

| Parameters     | Current Limit (mg/l) | Proposed Limit (mg/l) |
|----------------|----------------------|-----------------------|
| PH             | 5.5 – 11.5 (SU)      | 5.5 – 11.5 (SU)       |
| Arsenic        | 0.38                 | 0.38                  |
| Cadmium        | 0.12                 | 0.02                  |
| Chromium, (T)  | 7.0                  | 7.0                   |
| Chromium, (VI) | 0.19                 | 0.11                  |
| Copper         | 1.0                  | 1.0                   |
| Cyanide, (T)   | 1.5                  | 1.5                   |
| Cyanide, (A)   | 0.23                 | 0.23                  |
| Lead           | 0.3                  | 0.3                   |
| Mercury        | 0.0005               | 0.005                 |

|        |      |      |
|--------|------|------|
| Nickel | 2.5  | 2.5  |
| Silver | 0.64 | 0.64 |
| Zinc   | 4.1  | 4.1  |
| BTEX   | 10.0 | 10.0 |
| PAH    | 1.0  | 1.0  |

### West Hickman Wastewater Treatment Plant

| Parameters     | Current Limit (mg/l) | Proposed Limit (mg/l) |
|----------------|----------------------|-----------------------|
| PH             | 5.5 – 11.5 (SU)      | 5.5 – 11.5 (SU)       |
| Arsenic        | 4.5                  | 4.5                   |
| Cadmium        | 0.22                 | 0.14                  |
| Chromium, (T)  | 7.0                  | 7.0                   |
| Chromium, (VI) | 0.25                 | 0.22                  |
| Copper         | 1.0                  | 1.0                   |
| Cyanide, (T)   | 1.4                  | 1.4                   |
| Cyanide, (A)   | 1.0                  | 1.0                   |
| Lead           | 0.6                  | 0.6                   |
| Mercury        | 0.0005               | 0.005                 |
| Nickel         | 4.1                  | 4.1                   |
| Silver         | 4.8                  | 4.8                   |
| Zinc           | 4.1                  | 4.1                   |
| BTEX           | 10.0                 | 10.0                  |
| PAH            | 1.0                  | 1.0                   |